

# **System Engineering Support to Technology Studies**

**UPN 315-90-11**

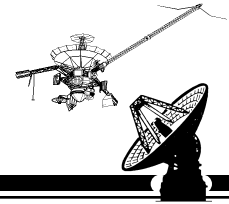
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**Semi-Annual Review of the FY97 SOMO/MO&DSD  
Technology Development Program**

**April 15, 1997**

# Support to Technology Studies

## Objective and Significance

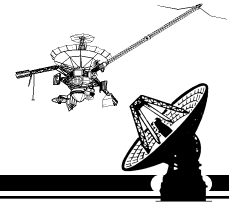

**GSFC**

### Overall Objective

*To enhance Space Network operations, efficiency, and support to users through appropriate introductions of new technology.*

<u>Goals</u>	<u>Significance</u>
<b>#1: Identify technology concepts potentially applicable to the SN:</b> <ul style="list-style-type: none"> <li>- Define SN needs based on emerging requirements.</li> <li>- Examine evolving technologies to establish promising candidates.</li> <li>- Survey future commercial satellite systems for applicable technologies/system concepts.</li> </ul>	• Activity plays a key role in keeping the SN (both space and ground infrastructure) up to date in the face of a changing user community and evolving technology.
<b>#2: Study most promising candidates:</b> <ul style="list-style-type: none"> <li>- Define architecture concepts for candidate technologies to meet emerging requirements.</li> <li>- Perform cost/benefit assessments.</li> </ul>	• Initial study activity assures that only the most promising candidates are pursued further.
<b>#3: Develop best technology candidates:</b> <ul style="list-style-type: none"> <li>- Define detailed hardware requirements.</li> <li>- Carry forward development through proof-of-concept phase.</li> </ul>	• Preliminary development work provides proof-of-concept prior to full-scale implementation.

## **Support to Technology Studies FY96 Accomplishments**



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### **Studied SN Needs and Identified/Studied Potential Technology Enhancements (Goal #'s 1 and 2)**

- **Examined SN needs and potentially useful technologies (including detailed examination of commercial technologies and approaches):**
  - **Key near-term need is to support large numbers of new MA users (including stationary users).**
- **Identified several technology areas of potential application to the SN:**
  - **Low cost H/W receivers and beamformers applicable to an MA Demand Access service capability.**
  - **Advanced coding concepts.**
- **Selected most promising candidates for further definition:**
  - **Low-cost hardware for MA Demand Access service.**
  - **Potential for Turbo codes for enhanced TDRSS link performance.**

## **Support to Technology Studies FY96 Accomplishments (Cont'd)**



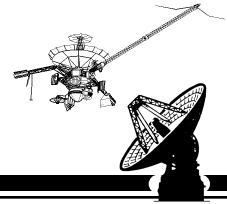
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### **Develop/Demonstrate High-rate Software Programmable Advanced Receiver (SPAR)**

- **Develop, test, and characterize a 300 Kbps PN/BPSK mode of operation for the SPAR:**
  - **Modify existing GARP PN/BPSK firmware for SPAR operation. Extend data rate support from 32 Kbps to 300 Kbps.**
- **Develop a low-cost, lab-grade interface card between the S-Band PORTCOM RF card and the SPAR RF/IF card:**
  - **Provides an S-Band interface for the SPAR.**
- **Demonstrated integrated operation of the new S-Band SPAR capability in a F/L application in DEC 96**
- **Demonstrated 64 Kbps GN mode data reception during an IUS launch support test in FEB 97 from WSC (recovered both 1,024 MHz subcarriers).**

## **Support to Technology Studies**

### **FY97 Goals**



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- **Continue technology examinations, keeping track of new SN needs and newly available technologies that could benefit both users and the SN:**
  - **Methods for enhancing SN operations.**
  - **Approaches for increasing SN capacity.**
  - **Approaches for meeting needs of evolving user community.**
- **Evaluate potential performance of Turbo Codes to the SN and users:**
  - **Theoretical performance is now well understood.**
  - **Study will quantify performance benefits and assess system impacts within the TDRSS architecture.**
  - **Simulation will be used to define performance within the context of existing SN ground station hardware.**
- **Evolve 300 Kbps capability to meet NASA needs. (256 Ksps duplex video conferencing application for ISS using ECOMM transcenter).**

